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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/678,741	10/04/2000	Tadahiro Ohmi	PM 274025 EL00009CDC	9698
909	7590	10/15/2003	EXAMINER	
PILLSBURY WINTHROP, LLP			CROWELL, ANNA M	
P.O. BOX 10500				
MCLEAN, VA 22102			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 10/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/678,741

Applicant(s)

OHMI ET AL.

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 9-12 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-20 is/are allowed.
- 6) ☒ Claim(s) 1-3, 7 and 21-23 is/are rejected.
- 7) ☒ Claim(s) 4-6, and 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 7, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tetsuka et al. (Japanese Patent Publication 06-061153A) in view of Hama et al (U.S. 5,525,159), and Oyama (Japanese Patent Publication 02-237020).

Referring to Drawing 1 and paragraph [0007], Tetsuka et al. discloses a plasma processing apparatus comprising a chamber (vacuum housing 2) of which interior can be depressurized, a gas supply system (gas inlet 5) constructed and arranged to supply a gas to the chamber and an exhaust system configured and arranged to exhaust the gas supplied to the

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chamber and to depressurize the chamber; a part of a wall constituting the chamber being a flat plate dielectric material plate (dielectric plate 3) formed of a material which passes a material which passes a microwave therethrough substantially without loss; a flat plate dielectric material shower plate (dielectric gas-evolution board 7), which is formed of a material which passes a microwave therethrough substantially without a loss, being provided between the dielectric material plate and plasma 6 and includes a plurality of gas discharge holes; a flat plate slot antenna 1 being provided on an outer side of the chamber with the dielectric material plate interposed therebetween so as to supply a microwave for exciting plasma through the dielectric material plate; and an electrode (substrate electrode holder 9) being provided on an inner side of the chamber so as to hold the substrate to be processed.

Regarding claim 7, Tetsuka in view of Hama, and Oyama fails to expressly disclose a thickness of a dielectric material shower plate. However, a prima facie case of obviousness still exists because it would have been obvious to one of ordinary skill in the art to optimize the distance and the thickness during routine experimentation in absence of a showing of criticality. Furthermore, where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, then the claimed device is not patentably distinct from the prior art device.

With respect to claim 23, as seen in Drawing 1, Tetsuka et al. teaches that a gas exiting through the plurality of discharge holes is evenly spread over substantially the entire surface of the substrate [0011].

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Tetsuka et al. fails to teach a lattice-like shower head formed of a metal pipe with holes oblique to the surface of the substrate.

Referring to Figures 1 and 2, column 5, line 4 – column 6, line 26, and column 9, lines 41-59, Hama et al. teaches a plasma processing apparatus comprising two gas distribution inlets 86 and 66. The two gas distribution inlets 82 and 62 allow different gases to be supplied to the chamber at different locations. In addition, a gas distribution inlet 152 includes a lattice-like shower head (vertical pipe lattice 156) provided between the dielectric material shower inlet 82 and the substrate S to be processed so as to discharge a gas, which has a composition different from that of the gas discharged from the dielectric material shower inlet, to a side of the substrate to be processed; at least a part of the gas discharged from the dielectric material shower inlet flows to the side of the substrate to be processed by being passed through an opening part of the lattice-like shower head. Moreover, the lattice-like shower head is formed of pipe comprising a plurality of gas discharge holes 154 which allows gases to fully and uniformly cover the entire process region of the substrate. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Tetsuka et al. with the lattice-like shower head as taught by Hama et al. This would provide additional gases to the process chamber at different locations and the lattice-like shower head would fully and uniformly cover the entire process region of the substrate.

Referring to Drawings 1 and 4, and the abstract, Oyama teaches a metal showerhead 14 which has gas discharge holes 15 oblique to the surface of the substrate (a wafer 13). The holes are inclined towards the center of the wafer 13 to obtain a uniform film. The metal showerhead is made of stainless steel, which is an excellent material used for corrosion resistance. Thus, it

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would have been obvious to one of ordinary skill in the art at the time of the invention to provide the metal lattice-like showerhead of Tetsuka et al. in view of Hama et al. with gas holes of Oyama. When the gas holes are inclined, a uniform film is formed on the wafer. In addition, stainless steel is an excellent metal for corrosion resistance.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tetsuka et al. (Japanese Patent Publication 06-061153A) in view of Hama et al (U.S. 5,525,159), and Oyama (Japanese Patent Publication 02-237020), as applied to claims 1, 7, and 23 above, and further in view of Otani et al. (Japanese Patent Publication 06-260434).

The teachings of Tetsuka et al. in view of Hama et al., and Oyama have been discussed above.

Tetsuka et al. in view of Hama et al., and Oyama fail to teach that the pipe is grounded.

Referring to Drawing 1 and paragraphs [0024]-[0025], Otani et al. teaches a plasma processing apparatus including a lattice-like shower head (the bipolar electrode 30) which can be grounded. This would prevent a person handling the lattice-like shower head from being electrically shocked. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to ground the pipe as taught by Otani et al. This would prevent a person handling the lattice-like shower head from being electrically shocked.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tetsuka et al. (Japanese Patent Publication 06-061153A) in view of Hama et al (U.S. 5,525,159), Oyama (Japanese Patent Publication 02-237020), and Otani et al. (Japanese Patent Publication 06-

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260434) as applied to claim 2 above, and further in view of Omi et al. (Japanese Patent Publication 11-302824).

The teachings of Tetsuka et al. in view of Hama et al., Oyama, and Otani et al. are discussed above.

Tetsuka et al. in view of Hama et al., Oyama, and Otani et al. fails to teach a stainless steel metal pipe containing aluminum with an aluminum oxide layer.

Referring to the abstract, Omi et al. teaches a method of forming a passivated film of aluminum oxide on the surface of stainless steel containing aluminum pipes. The passivated film made of aluminum oxide is used to protect the metal pipes from corrosion. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the lattice shower plate of Tetsuka et al. in view of Hama et al., Oyama, and Otani et al. with the passivated aluminum oxide coated metal pipes as taught by Omi et al. This would provide excellent corrosion resistance at a low price.

6. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tetsuka et al. (Japanese Patent Publication 06-061153A) in view of Hama et al (U.S. 5,525,159), and Oyama (Japanese Patent Publication 02-237020), as applied to claims 1, 7, and 23 above, and further in view of Matsuda et al. (6,189,485).

The teachings of Tetsuka et al. in view of Hama et al., and Oyama, are discussed above.

Tetsuka et al. in view of Hama et al., and Oyama fails to teach none of the plurality of gas discharge holes in the lattice-like shower head has a normal perpendicular to the surface of the substrate and a normal to each hole in a first portion of the plurality of gas discharge holes

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positioned inwardly towards a center of the substrate and a normal to each hole in a second portion of the plurality of gas discharge holes positioned outwardly away from the center of the substrate.

Referring to Figures 1 and 5 and column 6, lines 22-32 and column 7, line 61-column 8, line 5, Matsuda et al. teaches a plasma processing apparatus having a gas inlet structure wherein none of the plurality of gas discharge holes in the lattice-like shower head has a normal perpendicular to the surface of the substrate and a normal to each hole in a first portion of the plurality of gas discharge holes 25 positioned inwardly towards a center of the substrate and a normal to each hole in a second portion of the plurality of gas discharge holes 25 positioned outwardly away from the center of the substrate in order to deposit a thin film onto a surface of a large area substrate and to deposit a film onto the substrate surface under the condition that any place on the substrate surface has the same state. Thus, it would have been obvious to one of ordinary skill in the art to modify the holes of Tetsuka et al. in view of Hama et al., and Oyama so that none of the plurality of gas discharge holes in the lattice-like shower head has a normal perpendicular to the surface of the substrate and a normal to each hole in a first portion of the plurality of gas discharge holes is positioned inwardly towards a center of the substrate and a normal to each hole in a second portion of the plurality of gas discharge holes is positioned outwardly away from the center of the substrate in order to deposit a thin film onto a surface of a large area substrate and to deposit a film onto the substrate surface under the condition that any place on the substrate surface has the same state.



***Response to Arguments***

7. Applicant's arguments filed March 5, 2003 have been fully considered but they are not persuasive.

**Applicant has argued that the head of Hama et al. has a pipe lattice having supply holes 174 oriented downward as shown in Figures 12 and 14 of Hama et al, and therefore the gas exists through the holes vertically (normal) to the substrate.**

One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Furthermore, Hama et al was applied to teach a lattice-like shower head and Oyama was used to teach that it is known to provide holes to a gas inlet that are oblique to the surface of the substrate.

**Applicant has argued that the holes of Oyama are inclined towards the center, therefore Oyama's shower plate 14 does not allow to evenly spread the gas over the entire surface of the substrate.**

Claim 1 requires that the gas discharge holes are configured and arranged such that a normal to each of the holes is oblique to the surface of the substrate. In Drawings 3 and 4, Oyama clearly demonstrates holes that are oblique to the surface of the substrate. Claim 1 does not preclude the holes from inclining towards the center of the substrate. Moreover, since it is well known to one of ordinary skill in the art that a gas does not have a definite shape or volume, whenever you confine a gas to a container it completely fills it up whatever its shape or size

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might be, thus the gases in Tetsuka et al, Hama et al., or Oyama will spread over the entire surface of the substrate.

**Applicant has argued that Oyama et al. does not provide a lattice-like shower head having an opening part wherein at least a part of the gas discharged from a dielectric material shower plate flows through to the side of the substrate. Additionally, applicant has argued that the holes in the shower plate in Oyama are simply provided on a shower plate which corresponds to the dielectric material shower plate of the present invention. Therefore, the teachings of Oyama provides holes to a shower plate not to a metal pipe lattice-like shower head.**

The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Additionally, the Examiner did not use Oyama to replace the dielectric material shower plate of the present invention, but to demonstrate the teachings of having holes configured and arranged such that a normal to each of the holes is oblique to the surface of the substrate which can be applied to any gas inlet structure. Thus, Tetsuka et al, in view of Hama et al. and Oyama teaches a lattice-like showerhead having holes configured and arranged such that a normal to each of the holes is oblique to the surface of the substrate.

**Applicant has argued that Oyama's holes are normal to the wafer at least at the center of Oyama's showerhead and thus teaches away from the invention recited in claim 1 since one hole is normal to the surface of the wafer.**

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The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Additionally, the Examiner did not use Oyama to replace the lattice-like shower head of the present invention with Oyama's showerhead, but to demonstrate the teachings of having holes configured and arranged such that a normal to each of the holes is oblique to the surface of the substrate which can be applied to any gas inlet structure. Thus, Tetsuka et al, in view of Hama et al. and Oyama teaches a lattice-like showerhead having holes configured and arranged such that a normal to each of the holes is oblique to the surface of the substrate.

**Applicant has argued that a particular parameter (i.e. thickness) must first be recognized as a result-effective variable before the determination of the optimum or workable ranges of the variable might be characterized as routine experimentation.**

As evident in column 11, lines 4-12, Yamauchi et al. '382 teaches a dielectric material plate having a thickness of an integral multiple of a half of a wavelength of the microwave.

#### ***Allowable Subject Matter***

8. Claims 4-6 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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9. Claims 13-20 are allowed.

***Conclusion***

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

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AMC *aml*  
October 9, 2003

*Luz Alejandro Mulero*  
**LUZ ALEJANDRO-MULERO**  
**PRIMARY EXAMINER**